Appl. No. 10/630,989
Amdt. dated August 16, 2005
Reply to Office Action of May 17, 2005

PATENT

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings of claims in the application:

Listing of Claims:

1.   (Currently Amended) An apparatus for processing semiconductor substrates, the apparatus comprising:

a chamber defining a processing region therein;

a substrate support disposed in the chamber to support a semiconductor substrate;

at least one nozzle extending into the chamber to introduce a process gas into the chamber through a nozzle opening; and

at least one heat shield, each heat shield disposed around at least a portion of one of the at least one nozzle, the heat shield having an extension which projects distally of the nozzle opening of the nozzle and which includes a heat shield opening for the process gas to flow therethrough from the nozzle opening, the heat shield being spaced from the nozzle by a gap,

wherein the gap between the heat shield and the nozzle is smaller than a thickness of the heat shield.

2.   (Original) The apparatus of claim 1 wherein the heat shield comprises a ceramic material.

3.   (Original) The apparatus of claim 1 wherein the heat shield comprises a material selected from the group consisting of aluminum oxide, aluminum nitride, and silicon carbide.

4.   (Original) The apparatus of claim 1 wherein the extension of the heat shield projects distally of the nozzle opening by a distance of between about a radius of the nozzle and about a diameter of the nozzle.

5.   (Original) The apparatus of claim 1 wherein the heat shield is disposed around substantially the entire nozzle extending inside the chamber.

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6.   (Original) The apparatus of claim 1 wherein a plurality of nozzles are disposed around the substrate support and each nozzle has a heat shield disposed around at least a portion thereof.

7.   (Original) The apparatus of claim 6 wherein the heat shields are disposed around the substrate support and configured such that the heat shield openings of the heat shields are disposed radially outwardly of a periphery of the semiconductor substrate.

8.   (Original) The apparatus of claim 1 wherein the heat shield comprises a hollow, cylindrical member.

9.   (Currently amended) A heat shield for shielding a nozzle extending into a chamber to introduce a process gas into the chamber through a nozzle opening, wherein the chamber defines a processing region therein and has a substrate support to support a semiconductor substrate for processing in the chamber, the heat shield comprising:

        a hollow member configured to be coupled with the nozzle and having an internal dimension sufficiently large to be disposed around at least a portion of the nozzle, the hollow member having an extension which projects distally of the nozzle opening of the nozzle and which includes a heat shield opening for the process gas to flow therethrough from the nozzle opening, the hollow member being spaced from the nozzle by a gap which is smaller than a thickness of the hollow member.

10.   (Original) The heat shield of claim 9 wherein the hollow member is cylindrical and has an internal cross-section which is slightly larger than an external cross-section of the nozzle.

11.   (Original) The heat shield of claim 9 wherein the hollow member comprises a ceramic material.

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12.   (Original) The heat shield of claim 9 wherein the extension of the heat shield is sized to project distally of the nozzle opening by a distance of between about a radius of the nozzle and about a diameter of the nozzle.

13.   (Canceled)

14.   (Canceled)

15.   (Canceled)

16.   (Canceled)

17.   (Canceled)

18.   (Canceled)

19.   (Canceled)

20.   (Canceled)

21.   (New) The apparatus of claim 1 wherein the heat shield is integrally formed with the nozzle.

22.   (New) The apparatus of claim 1 wherein the heat shield is coupled with the nozzle by a threaded connection.

23.   (New) The heat shield of claim 9 wherein the heat shield is integrally formed with the nozzle.

24.   (New) The heat shield of claim 9 wherein the heat shield is coupled with the nozzle by a threaded connection.